



MSMR



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Contents

Vaccine preventable diseases, active duty, US Armed Forces, 1998-2002.....	2
ARD surveillance update.....	5
Pre-deployment medical evaluation forms, US Armed Forces, 1996-2003.....	6
Sentinel reportable events.....	10

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Vaccine Preventable Diseases, Active Duty, US Armed Forces, 1998-2002

For many years, all enlisted accessions to the US military services have been immunized against influenza, measles, rubella, polio, tetanus, diphtheria, and meningococcus.¹ Until recently, vaccines against adenovirus types 4 and 7 were also administered to Army, Navy and Marine Corps recruits; however, adenovirus vaccine production ceased in 1996, and vaccine stocks were depleted in 1999.² In April 1995, the Department of Defense began a phased program to achieve universal vaccination of servicemembers against hepatitis A.^{3,4} Since 1999 and 2002, respectively, vaccinations against varicella and hepatitis B have been required of all recruits who lack evidence of immunity.^{5,6} This report estimates frequencies, incidence rates, and trends of 12 vaccine-preventable diseases among active duty US military personnel from 1998 to 2002. In addition, it summarizes demographic characteristics of servicemembers who were diagnosed with vaccine preventable diseases.

Methods. The Defense Medical Surveillance System (DMSS) was searched to identify first episodes per active duty servicemember of clinical diagnoses of selected vaccine preventable diseases between 1 January 1998 and 31 December 2002. For surveillance purposes, a "confirmed" case of a vaccine preventable illness was defined as a primary hospital discharge diagnosis or a report of a notifiable medical event that was coded with one of the following (based on the International Classification of Diseases, 9th revision, clinical modifications [ICD-9-CM]): varicella (ICD-9-CM: 052); tetanus (ICD-9-CM: 037); pertussis (ICD-9-CM: 033); poliomyelitis (ICD-9-CM: 045); measles (ICD-9-CM: 055); mumps (ICD-9-CM: 072); rubella (ICD-9-CM: 056); diphtheria (ICD-9-CM: 032); meningococcal infection (ICD-9-CM: 036.0, 036.1, 036.2, 036.9); influenza (ICD-9-CM: 487); hepatitis B (ICD-9-CM: 070.2, 070.3); or hepatitis A (ICD-9-CM: 070.0, 070.1). Information regarding military and demographic characteristics of cases on dates of diagnoses of vaccine-preventable diseases were abstracted from records in the DMSS.

Results. From 1998 to 2002, the most common vaccine preventable diseases among active duty personnel were influenza (n = 844), varicella (n = 677), and hepatitis B (n = 359) (figure, table). During the period, the incidence rate of varicella sharply decreased, the rate of influenza generally increased, and the rate of hepatitis B was fairly stable. There were not more than 16 cases in any year of hepatitis A, meningococcal disease, mumps, or pertussis. Finally, during the period, there were only single cases of tetanus and measles and no cases of rubella, diphtheria, or poliomyelitis (table).

Compared to their counterparts, servicemembers diagnosed with vaccine preventable diseases were relatively likely to have fewer than 2 years of military service and to be enlisted, younger than 40, and other than White or Black race. There were no apparent associations between risk of vaccine-preventable illnesses and gender, marital status, or military occupation (data not shown).

Editorial comment. For this report, cases of vaccine preventable diseases were ascertained from hospital discharge diagnoses and reports of notifiable medical events. Vaccine preventable illnesses that were not documented and reported with specific etiologic diagnoses were not included. In addition, to increase the specificity of the surveillance case definition, cases diagnosed exclusively in outpatient settings (if they were not also reported as notifiable medical events) were not included. As a result, the numbers of cases reported here probably underestimate the actual numbers of vaccine-preventable illnesses that occurred among servicemembers during the period.

The most encouraging trend observed during the period was the sharp and persistent decline in varicella. The decline was not unexpected because mandatory vaccination of all nonimmune recruits began in 1999.

In spite of universal annual vaccinations against influenza, incidence rates of influenza tended to increase during the period. In the past several years, the military health system has increased surveillance of viral etiologies of influenza-like illnesses.⁷ Thus, recent increases in numbers and rates of influenza

Figure 1. Confirmed cases of selected vaccine-preventable diseases*, by year, active duty, US Armed Forces, 1998-2002.

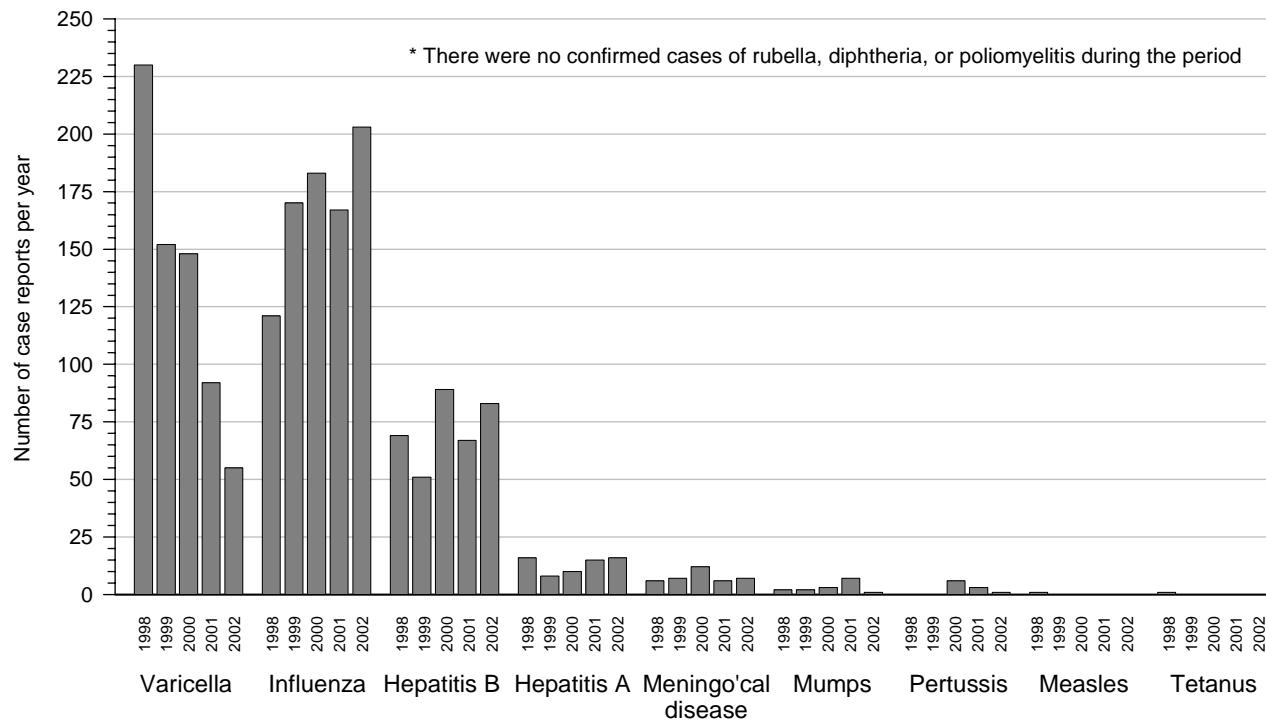


Table 1. Confirmed* cases of vaccine preventable illnesses, active duty, US Armed Forces, 1998-2002

	1998	1999	2000	2001	2002	Total
Influenza	121	170	183	167	203	844
Varicella	230	152	148	92	55	677
Hepatitis B	69	51	89	67	83	359
Hepatitis A	16	8	10	15	16	65
Meningococcal disease	6	7	12	6	7	38
Mumps	2	2	3	7	1	15
Pertussis	0	0	6	3	1	10
Measles	1	0	0	0	0	1
Tetanus	1	0	0	0	0	1
Rubella	0	0	0	0	0	0
Diphtheria	0	0	0	0	0	0
Poliomyelitis	0	0	0	0	0	0

* confirmed cases are identified from hospital discharge diagnoses and/or notifiable medical event reports

may reflect, at least in part, improvements in case ascertainment and reporting.

Rates of hepatitis A and B were fairly stable during the period. Servicemembers who were not black or white had relatively high rates of both hepatitis A and B. The finding likely reflects increased risks related to exposures to endemic areas outside the United States (rather than risks directly related to race or ethnicity).

For many years, infants and children in the United States have been immunized routinely against diphtheria, pertussis, tetanus, polio, measles, mumps, and rubella. Because of current high levels of immunity among U.S. residents and aggressive public health responses to imported cases, these diseases are no longer endemic in the U.S.^{8,9} Not surprisingly, there were few or no cases of these diseases among US servicemembers during the surveillance period.

Finally, incidence rates of meningococcal disease were persistently low during the period. Because all recruits are immunized against meningococcal serogroups A, C, Y, and W135, it is likely that most cases of meningococcal disease that did occur among U.S. servicemembers were caused by serogroup B strains (which are not vaccine preventable).¹⁰

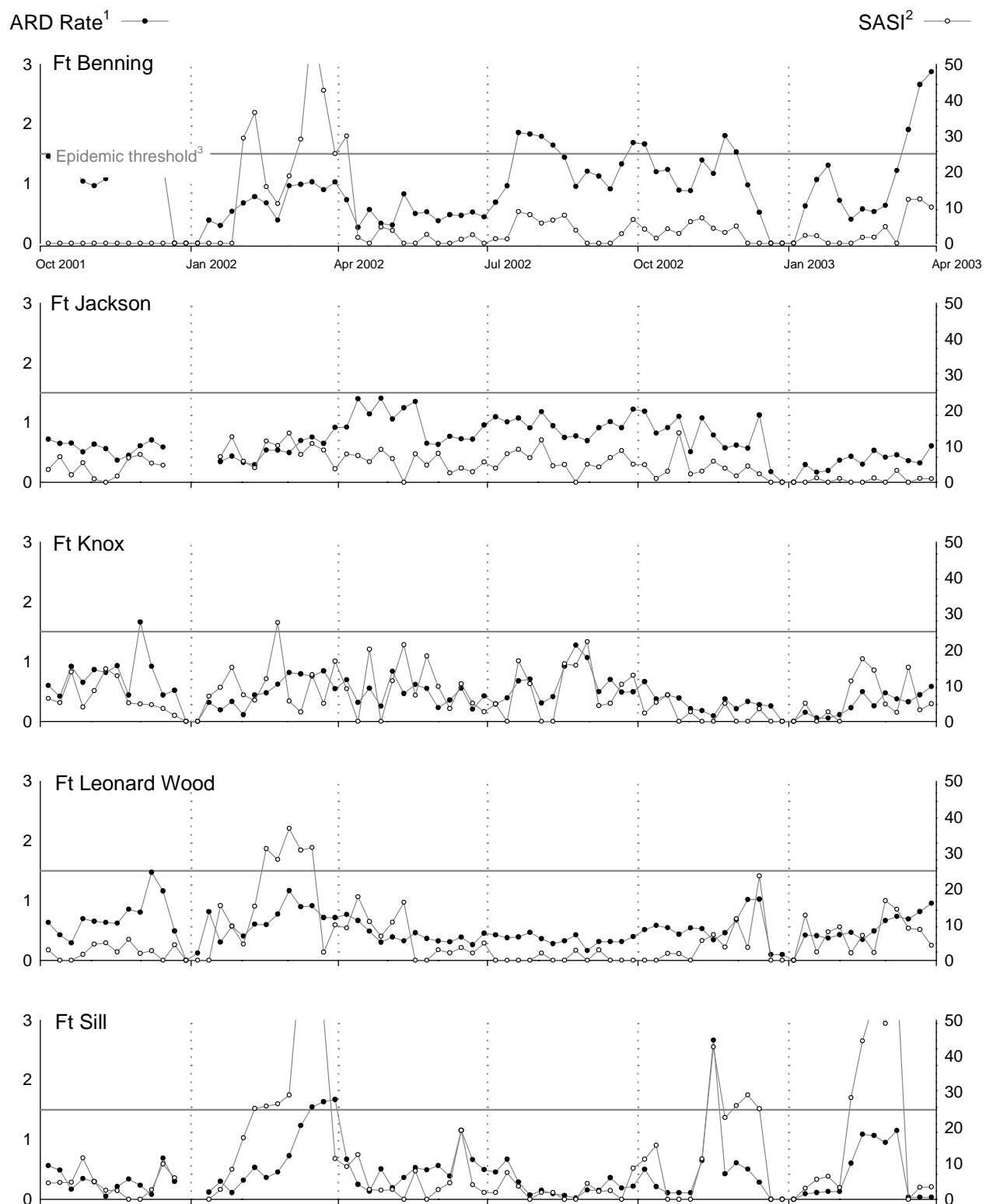
Analysis by Karen Campbell, MS, and report by Lt Col Mark K. Arness, MD, MPH, US Air Force, Army Medical Surveillance Activity.

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**Acute respiratory disease (ARD) and streptococcal pharyngitis (SASI),
Army Basic Training Centers, by week through March 29, 2003**



¹ARD rate = cases per 100 trainees per week

²SASI (Strep ARD surveillance index) = (ARD rate)(rate of Group A beta-hemolytic strep)

³ARD rate ≥ 1.5 or SASI ≥ 25.0 for 2 consecutive weeks indicates an "epidemic"

Pre-deployment Medical Evaluation Forms, US Armed Forces, January 1996-March 2003

The nature and intensity of medical surveillance of deployed U.S. servicemembers significantly changed in response to the end of the cold war, the diverse medical concerns of veterans of the Persian Gulf War, and the increasing frequency and scopes of joint and multinational operations.^{1,2} As an example, all servicemembers who now deploy overseas for 30 days or longer to a land-based location that does not have a permanent U.S. military medical treatment facility are required to complete a self-administered medical assessment prior to deploying.³⁻⁵

Currently, all pre-deployment medical evaluation forms are sent to the Army Medical Surveillance Activity (AMSA) where they are scanned to produce electronic images. In addition, data on the forms are entered into a database that is integrated into the Defense Medical Surveillance System (DMSS). This report summarizes the numbers of pre-deployment medical evaluation forms that were sent to and processed by the AMSA during the period January 1996 to March 2003.

Results. During the 87-month surveillance period, 592,609 pre-deployment medical evaluation forms were received and processed by the AMSA. Figure 1 shows the distribution of pre-deployment forms by dates that they were completed—the mean number of forms completed per month during the period was 6,812.

In general, the numbers of forms completed per month steadily increased from 1996 through 2002 (figure 1). However, the number of pre-deployment forms sharply increased in January 2003 (figure 1); and during February 2003, nearly 75,000 forms—more than one-eighth of all forms received during the entire period—were completed and sent to AMSA (table).

During the period, 387 installations/locations submitted pre-deployment medical evaluation forms from US servicemembers. Of these, 55 installations/locations submitted at least 3,000 pre-deployment medical evaluation forms each (table). Of active military installations in the U.S., the largest numbers of forms were completed at Fort Bragg, NC; Fort Stewart, GA; Fort Hood, TX; Fort Campbell, KY;

Fort Carson, CO; and Fort Benning, GA (Army); Camp Pendleton, CA (Marine Corps); and Pope AFB, NC; Travis AFB, CA; Moody AFB, GA; and Eglin AFB, FL (Air Force) (table).

Finally, figure 2 summarizes the processing of pre-deployment forms at AMSA from January through March 2003. The numbers of forms scanned and data entered generally increased during the period (figure 2); and during each week of March, more than 17,700 forms were scanned and more than 19,300 forms were data entered (figure 2).

Editorial comment: Federal law, DoD policies, and current force health protection doctrine require that servicemembers have medical evaluations prior to and after returning from extended joint military operations overseas. The completion of standardized, self-administered medical assessment questionnaires are part of the pre- and post-deployment medical evaluation processes. Currently, hard copies of completed forms are sent to the AMSA where they are scanned and data entered into a centralized data archive—the average time from receipt of a medical assessment form at AMSA to completion of scanning and data entry is approximately one week. In the near future, results of deployment-related medical evaluations (including self-administered medical assessments) will be completed using lap top computers connected to the internet; completed evaluations will be transmitted electronically to a centralized data archive; and health care providers worldwide will be able to access through the internet previous deployment-related evaluations of individual servicemembers.

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Figure 1. Pre-deployment forms, total and average per month, during specified periods, US Armed Forces, January 1996-Febraury 2003.*

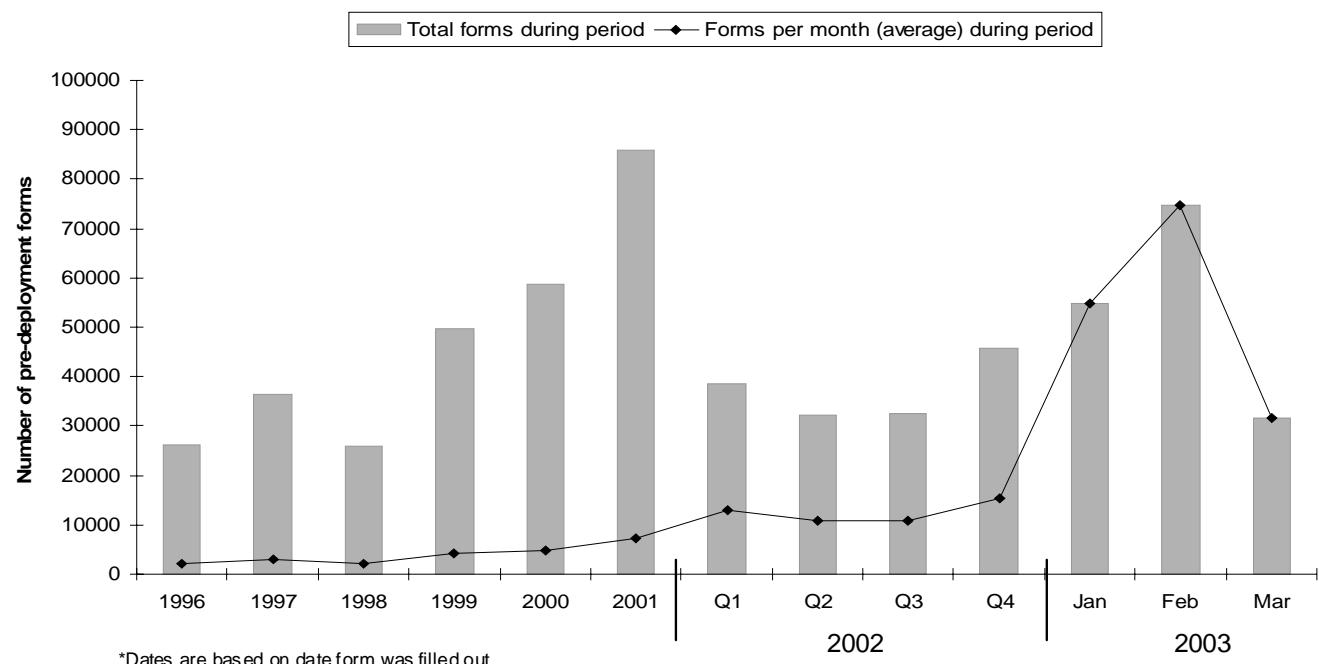
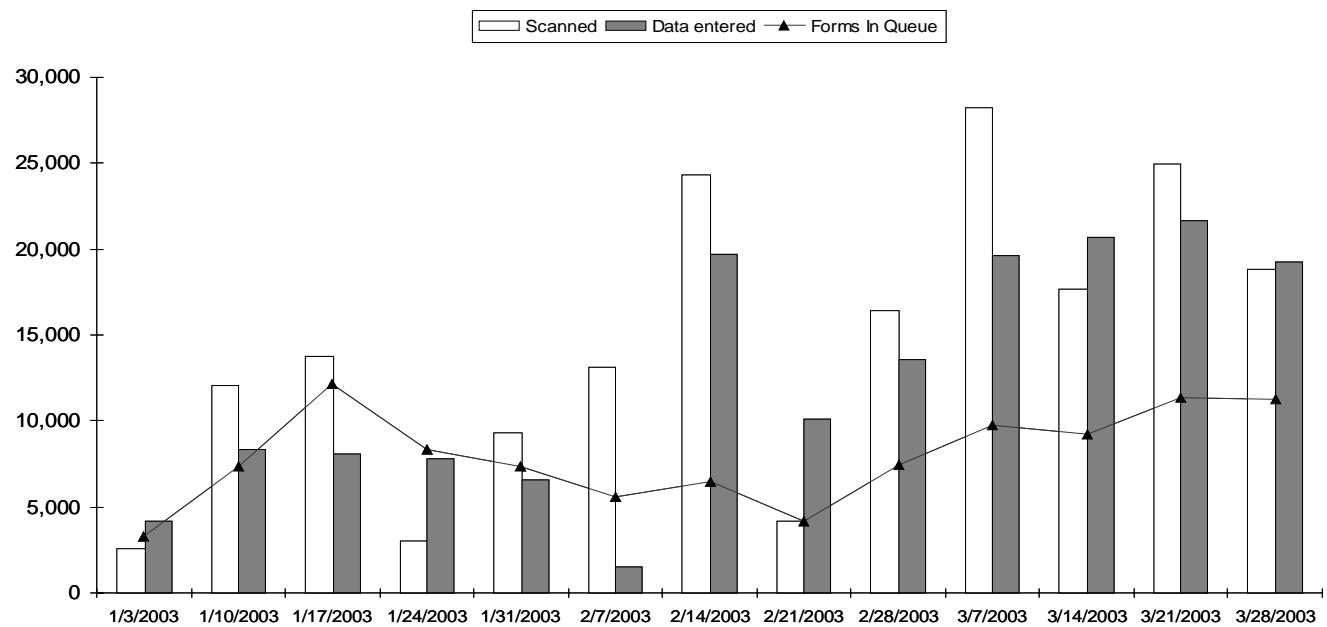


Table 1. Number of pre-deployment medical evaluation forms, by U.S. military installation/location of assignment,* by time period and service, January 1996 - March 2003

	1996	1997	1998	1999	2000	2001	2002				2003			Total
							Qtr 1	Qtr 2	Qtr 3	Qtr 4	Jan	Feb	Mar	
United States - Air Force														
Pope AFB, NC	6	624	148	444	1,226	1,077	422	692	240	552	344	696	163	6,634
Travis AFB, CA	46	544	363	558	941	1,570	535	338	169	533	235	409	109	6,350
Moody AFB, GA	70	374	94	1,309	642	1,349	596	444	350	661	263	84	12	6,248
Eglin AFB, FL	4	277	350	721	1,298	1,445	698	614	164	63	314	18	64	6,030
McGuire AFB, NJ	21	382	218	490	1,013	939	698	665	468	309	197	101	4	5,505
Shaw AFB, SC	10	677	291	627	965	1,247	342	86	314	195	133	125	11	5,023
Beale AFB, CA	8	259	368	1,092	436	1,032	195	393	317	333	309	245	9	4,996
Mountain Home AFB, ID	8	1,021	700	357	140	1,485	36	926	68	13	63	35	1	4,853
Offutt AFB, NE	15	774	304	147	717	914	264	472	160	311	520	138	97	4,833
Fairchild AFB, WA	9	708	262	773	715	890	140	513	440	317	1	16	1	4,785
Nellis AFB, NV	39	426	434	679	631	678	333	520	186	563	179	65	5	4,738
Davis-Monthan AFB, AZ	11	394	265	545	683	1,366	88	137	377	320	370	154	2	4,712
Little Rock AFB, AR	7	369	51	687	715	726	559	163	562	386	184	196	80	4,685
Langley AFB, VA	9	953	139	493	777	1,711	64	75	42	240	109	2	2	4,616
Tinker AFB, OK	23	893	419	407	402	624	586	502	556	60	1	1	1	4,475
Dyess AFB, TX	3	375	56	638	496	429	703	48	324	419	175	342	80	4,088
Elmendorf AFB, AK	5	111	182	1,770	601	288	2	288	32	64	9	277	92	3,721
McConnell AFB, KS	50	721	494	108	199	265	131	102	455	356	282	289	68	3,520
Hurlburt Field, FL	67	203	415	1,474	821	453	2	0	2	1	2	10	1	3,451
Seymour Johnson AFB, NC	11	637	568	988	138	310	129	9	6	19	208	175	112	3,310
Robins AFB, GA	10	195	325	543	552	776	479	106	250	13	1	27	1	3,278
Cannon AFB, NM	6	426	357	332	931	574	15	15	7	328	29	33	0	3,053
Charleston AFB, SC	30	158	141	98	274	743	544	136	425	141	155	158	27	3,030
Hill AFB, UT	3	781	222	661	421	396	284	129	63	27	27	1	0	3,015
United States - Army														
Fort Bragg, NC	272	726	290	2,584	1,803	4,245	1,153	3,313	1,423	4,017	2,008	2,099	1,460	25,393
Fort Stewart, GA	8	140	2,523	208	74	3,203	780	442	1,948	7,992	1,406	322	59	19,105
Fort Hood, TX	72	1,298	1,129	2,790	1,220	2,401	770	432	289	1,022	1,616	478	79	13,596
Fort Campbell, KY	79	17	92	465	956	2,602	438	90	106	71	900	6,700	333	12,849
Fort Carson, CO	26	152	6	68	285	178	283	89	137	738	2,506	4,630	2,283	11,381
Fort Benning , GA	131	338	772	914	97	756	1,080	700	212	165	261	721	166	6,313
Fort Bliss, TX	108	90	89	44	259	154	231	129	21	485	2,827	924	480	5,841
Fort Drum, NY	5	199	4	527	50	3,360	863	176	35	24	186	142	230	5,801
Fort Polk, LA	28	316	1,114	16	94	941	100	55	309	341	962	631	739	5,646
Fort Lewis, WA	1	161	300	101	284	274	892	557	313	141	834	1,104	301	5,263
Fort Riley, KS	78	841	7	40	32	57	392	724	31	19	35	1,464	632	4,352
Hunter Army Airfield, GA	1	9	50	14	77	891	266	112	94	1,634	779	368	10	4,305
Fort Eustis, VA	6	0	75	466	149	234	203	63	15	383	1,083	771	146	3,594
United States - Marines														
MCB Camp Pendleton, CA	70	562	1,683	6	2,017	1,650	72	415	11	550	380	112	5	7,533
MCB Camp Lejeune, NC	13	1	9	8	2,441	604	221	10	218	126	1,899	190	13	5,753
United States - other														
California - Other	6	104	31	25	217	595	476	153	582	53	208	588	391	3,429
New York - Other	1	0	0	31	680	363	442	280	220	524	306	569	507	3,923
Ohio - Other	1	0	1	98	681	862	226	236	174	77	423	695	354	3,828
Oklahoma - Other	2	29	0	177	585	667	135	43	165	486	551	464	64	3,368
Illinois - Other	1	1	1	16	791	130	605	61	78	96	315	622	556	3,273
Pennsylvania - Other	1	2	2	10	25	420	188	377	132	126	530	600	679	3,092
Tennessee - Other	0	1	3	18	185	442	423	282	502	253	268	516	161	3,054
Texas - Other	4	80	43	262	245	834	405	104	572	178	1,047	1,174	109	5,057
Outside the United States														
Europe - Other	12,495	879	1,170	1,323	336	131	23	476	15	17	9	103	16	16,993
Germany - Other	1,439	242	128	527	204	344	533	87	144	57	323	1,150	126	5,304
Schweinfurt, GE	374	2,046	2	557	4	13	160	1,499	9	3	77	49	22	4,815
Spangdahlem AB, GE	25	360	466	97	1,126	993	405	80	22	338	393	403	13	4,721
Kadena AB, JA	5	174	409	722	1,207	787	99	123	125	297	2	7	0	3,957
Ramstein AB, GE	113	256	74	550	1,071	710	5	80	89	621	128	47	4	3,748
Baumholder, GE	1,382	3	90	497	1,236	14	4	1	1	2	10	27	13	3,280
Bamberg, GE	608	230	6	727	12	4	63	231	10	385	553	289	26	3,144
Unknown	2,282	5,320	2,173	7,020	2,879	6,332	4,258	3,353	6,125	3,786	9,043	17,596	9,068	79,235
Total	26,163	36,326	25,780	49,729	58,762	85,776	38,423	32,302	32,447	45,734	54,802	74,783	31,582	592,609
Average (per month)	2,180	3,027	2,148	4,144	4,897	7,148	12,808	10,767	10,816	15,245	54,802	74,783	31,582	6,812

* only installations/locations with at least 3,000 predeployment forms are included

Figure 2. Weekly numbers of pre-deployment medical assessment forms in process, Army Medical Surveillance Activity, January-March 2003.*



*Dates are based on date scanned and entered, respectively

**Sentinel reportable events for all beneficiaries¹ at US Army medical facilities,
cumulative numbers² for calendar years through March 31, 2002 and 2003**

Reporting location	Number of reports all events ³		Food-borne								Vaccine Preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
NORTH ATLANTIC																
Washington, DC Area	83	78	1	.	1	1	.	2	6	2	.	.	.	.	.	.
Aberdeen, MD	10	20	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Belvoir, VA	62	51	3	1	1	.	4	3	.	.	.	.	.	.	.	.
FT Bragg, NC	534	493	3	.	.	.	2	2	.	8	.	.	1	.	.	2
FT Drum, NY	17	68	.	.	.	.	.	.	.	.	.	.	.	.	.	1
FT Eustis, VA	60	72	1	.	.	.	.	.	4	.	.	.	1	.	.	2
FT Knox, KY	37	52	.	.	1	.	2	2	.	.	.	.	.	.	.	.
FT Lee, VA	71	51	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Meade, MD	17	37	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Monmouth, NJ	7	8	.	2	.	.	1	.	.	.	.	1	.	1	.	.
West Point, NY	74	68	.	.	.	.	.	2	.	.	.	.	.	.	.	.
GREAT PLAINS																
FT Sam Houston, TX	64	72	.	1	1	1	2	1	1	1	.	.	.	.	.	.
FT Bliss, TX	202	160	1	.	2	.	.	2	.	.	.	.	1	.	.	.
FT Carson, CO	514	363	.	1	.	.	3	2	1	1	.	.	.	.	.	.
FT Hood, TX	9	20	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Huachuca, AZ	12	11	.	1	.	.	.	.	.	.	.	1	.	.	.	.
FT Leavenworth, KS	76	71	.	.	.	.	.	.	.	.	.	.	.	.	2	3
FT Leonard Wood, MO	24	56	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Polk, LA	43	37	.	1	.	.	.	.	.	.	.	.	.	1	.	.
FT Riley, KS	51	86	.	.	.	.	.	.	1	.	.	.	.	.	.	.
FT Sill, OK	51	58	.	.	.	.	.	1	.	.	1	.	.	.	.	.
SOUTHEAST																
FT Gordon, GA	101	96	.	.	1	.	4	1	.	.	.	.	.	.	.	.
FT Benning, GA	203	155	2	1	.	.	2	2	.	.	.	.	.	.	1	.
FT Campbell, KY	73	6	.	.	.	.	.	.	.	.	.	.	.	.	1	.
FT Jackson, SC	17	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Rucker, AL	160	84	.	.	.	.	2	1	.	1	.	.	.	.	.	.
FT Stewart, GA	184	128	.	.	.	2	2	2	.	.	.	.	.	.	.	.
WESTERN																
FT Lewis, WA	16	13	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Irwin, CA	27	24	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Wainwright, AK	229	249	5	3	7	1	1	4	.	2	.	.	1	.	.	.
OTHER LOCATIONS																
Hawaii	436	404	5	6	.	.	6	4	.	.	.	3	3	.	2	.
Europe	91	93	.	.	.	.	.	.	.	.	.	.	.	.	1	.
Korea																
Total	3,555	3,194	21	17	14	5	31	31	13	15	2	4	7	2	7	8

1. Includes active duty servicemembers, dependents, and retirees.

2. Events reported by April 7, 2002 and 2003.

3. Seventy events specified by Tri-Service Reportable Events, Version 1.0, July 2000.

Note: Completeness and timeliness of reporting vary by facility.

Source: Army Reportable Medical Events System.

**(Cont'd) Sentinel reportable events for all beneficiaries¹ at US Army medical facilities,
cumulative numbers² for calendar years through March 31, 2002 and 2003**

Reporting location	Arthropod-borne				Sexually Transmitted								Environmental			
	Lyme Disease		Malaria		Chlamydia		Gonorrhea		Syphilis ³		Urethritis ⁴		Cold		Heat	
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
NORTH ATLANTIC																
Washington, DC Area	1	.	.	.	19	50	3	2	1	2	.	.	.	.	.	.
Aberdeen, MD	10	7	.	5	.	.	.	.	.	8	.	.
FT Belvoir, VA	43	36	10	11	.	.	.	.	.	.	.	.
FT Bragg, NC	.	.	1	1	399	357	66	87	1	2	40	32	.	2	12	.
FT Drum, NY	13	43	4	9	.	.	.	.	.	4	.	.
FT Eustis, VA	45	54	9	14	.	1	.	.	.	.	.	.
FT Knox, KY	30	44	4	6	.	.	.	.	.	.	.	.
FT Lee, VA	61	35	10	16	.	.	.	.	.	.	.	.
FT Meade, MD	16	32	1	5	.	.	.	.	.	.	.	.
FT Monmouth, NJ	1	1	.	.	3	3	2	.	.	.	.	.	.	.	.	.
West Point, NY	50	48	3	16	.	1	.	.	.	.	.	.
GREAT PLAINS																
FT Sam Houston, TX	16	48	2	10	.	1	.	.	.	.	.	.
FT Bliss, TX	107	111	22	15	.	.	24	23	1	2	.	.
FT Carson, CO	.	.	1	.	250	192	108	61	.	.	64	66	.	5	.	.
FT Hood, TX	7	19	2	1	.	.	.	.	.	.	.	.
FT Huachuca, AZ	8	8	3	1	.	.	.	.	.	.	.	.
FT Leavenworth, KS	55	57	14	5	.	.	2	.	.	2	1	1
FT Leonard Wood, MO	18	37	5	19	1	.	.	.	.	.	.	.
FT Polk, LA	23	32	9	2	.	.	.	.	11	.	.	.
FT Riley, KS	29	46	10	12	.	1	11	20	.	.	.	.
FT Sill, OK	45	49	3	8	.	.	.	.	.	.	.	.
SOUTHEAST																
FT Gordon, GA	67	61	26	33	.	.	.	.	.	.	.	.
FT Benning, GA	161	107	33	35	.	1	.	.	1	2	.	.
FT Campbell, KY	55	.	15	.	1	.	.	.	1	4	.	.
FT Jackson, SC	12	6	5	4	.	.	.	.	.	.	.	.
FT Rucker, AL	112	37	45	25	.	.	.	15	.	.	.	1
FT Stewart, GA	131	63	21	25	.	.	30	28	.	.	.	.
WESTERN																
FT Lewis, WA	12	11	4	2	.	.	.	.	.	.	.	.
FT Irwin, CA	21	8	.	1	.	.	.	.	6	12	.	.
FT Wainwright, AK	161	155	26	22	.	.	.	.	.	.	.	1
OTHER LOCATIONS																
Hawaii	.	.	2	.	325	298	81	77	2	1	2	.	4	2	.	.
Europe	.	.	1	.	63	80	22	9	.	.	1	.	2	2	.	.
Korea																
Total	2	1	5	1	2,367	2,134	568	538	6	10	174	184	26	45	13	3

3. Primary and secondary.

4. Urethritis, non-gonoccal (NGU).

Note: Completeness and timeliness of reporting vary by facility.

Source: Army Reportable Medical Events System.

Commander
U.S. Army Center for Health Promotion
and Preventive Medicine
ATTN: MCHB-TS-EDM
5158 Blackhawk Road
Aberdeen Proving Ground, MD 21010-5403

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Inquiries regarding content or material to be considered for publication should be directed to: Editor, Army Medical Surveillance Activity, Building T-20, Room 213 (Attn: MCHB-TS-EDM), 6900 Georgia Avenue, NW, Washington, D.C. 20307-5001. E-mail: editor@amsa.army.mil